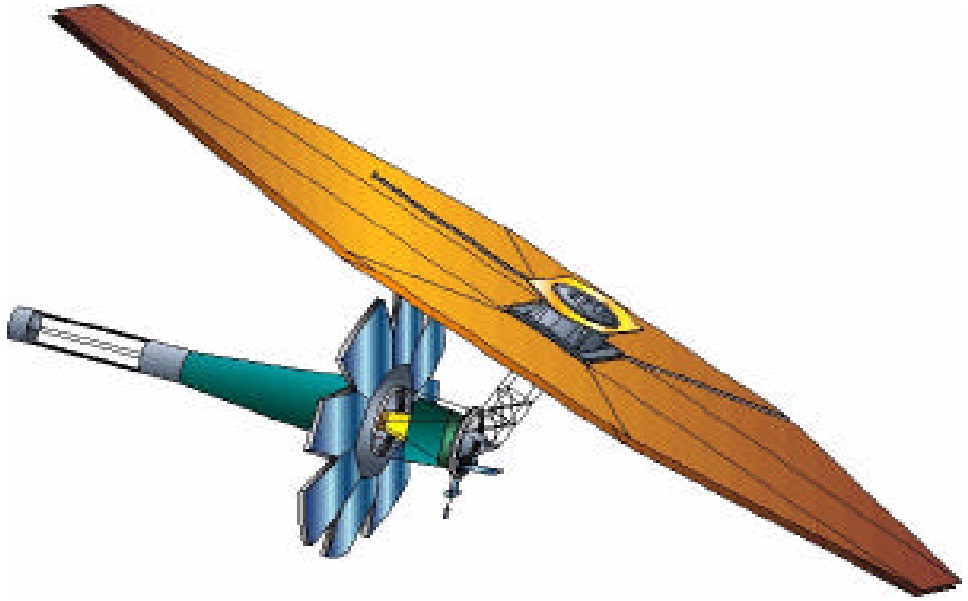
NGST QUARTERLY
9 OCTOBER 1997

# SUNSHIELD MEMBRANE MATERIALS



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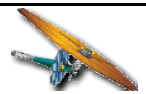

# BACKGROUND

**In 1996 CAN studies, AgFEP baselined for sun-facing shield layer**

**AgFEP used for HST degraded in space environment**

**- numerous tears revealed on SM-2, Feb '97**

**For the NGST sunshield, AgFEP will not be acceptable**

**- sunshield is unsupported, thin film**
**- sun-side layer will experience 5-10 years of constant solar UV, solar wind, and meteoroids**

**Work with the Inflatables Group (Pathfinder I) led to realization that many sunshield membrane issues to be addressed**

# PLAN TO ADDRESS SUNSHIELD ISSUES

**Perform search to identify candidate materials for sunshield and gather existing flight and ground test data**

**Where data does not exist, perform tests to determine that material will survive NGST mission**

**Develop materials that will meet NGST mission requirements and verify with ground testing**

**Identify facilities that are best to perform this work**

# CANDIDATE MATERIALS FOR NGST

**Kapton coated with $Ag/Al_2O_3/Si_xO_2$** ***(aka "silver composite")***

**Kapton coated with $VDA/SiO_x$**

**TOR** ***(kapton replacement, can imbed conductive material in film)***

**CP-1/CP-2** ***(cast polyimide films developed by LaRC)***

**MPCP** ***(metal doped cast polyimide film, LaRC)***

**Others found through literature search**

# EVALUATE LONG TERM EFFECTS

**For NGST at L2:**

**Solar UV**
**Solar Wind**
**X-Rays**
**Radiation from solar events**
**Micrometeroids**

**L2 environment characterization to be released by MAP project. Radiation environment presented will be used to determine conditions for NGST shield membrane testing.**

# EVALUATE CRITICAL PROPERTIES

## Properties that must be maintained over 5-10 years:

| | |
|---|---|
| **Thermal** | **low α and high ε** |
| **Mechanical** | **cold T behavior**<br>**coeff. of thermal expansion (CTE)**<br>**elasticity**<br>**creep**<br>**resistance to tearing**<br>**esd behavior** |
| **Contamination** | **molecular outgassing**<br>**particulate flaking** |

# EVALUATE ACCEPTABILITY FOR DEPLOYMENT APPLICATION

**Effects of: compressing into a small volume**
**folding**
**shaping**
**rolling**
**deploying (unfolding or unrolling)**

**Seamability**

**Storing - shelf life**

# CURRENT ACTIVITIES

**Overall plan for sunshield membrane prepared**

**Collaboration with Langley established**

**Proposal to Space Environment Effects (SEE) submitted**

**Propose teaming as follows:**

**GSFC: Measure mechanical, thermal, contamination properties**
**Test material under solar wind influence**

**LaRC: Polymer development**

**MSFC: Combined Environmental Effects testing**